

Microtextured Surfaces for Turbine Blade Impingement Cooling, Phase II

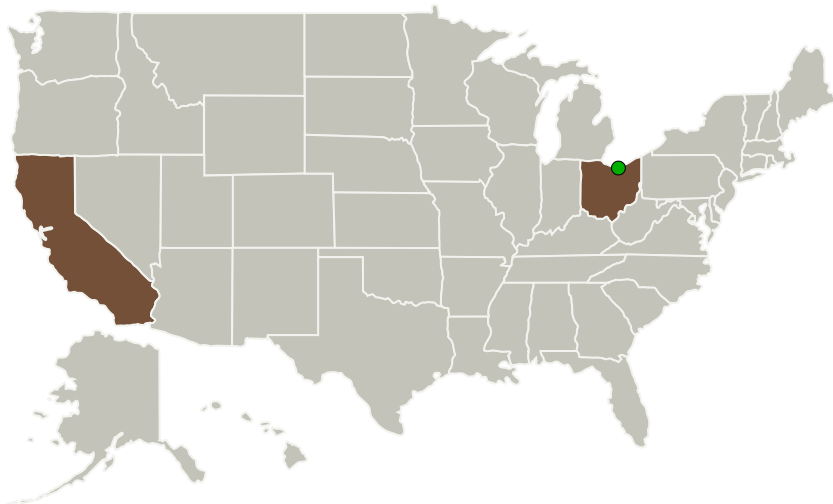
Completed Technology Project (2012 - 2016)



Project Introduction

Gas turbine engine technology is constantly challenged to operate at higher combustor outlet temperatures. In a modern gas turbine engine, these temperatures can exceed the blade and disk material limits by 600 °F or more, necessitating both internal and film cooling schemes in addition to the use of thermal barrier coatings. Internal convective cooling is inadequate in many blade locations, and both internal and film cooling approaches can lead to significant performance penalties in the engine. Micro Cooling Concepts has developed a turbine blade cooling concept that provides enhanced internal impingement cooling effectiveness via the use of micro-structured impingement surfaces. These surfaces significantly increase the cooling capability of the impinging flow, as compared to a conventional untextured surface. This approach can be combined with microchannel cooling and external film cooling to tailor the cooling capability per the external heating profile. The cooling system can then be optimized to minimize impact on engine performance.

Primary U.S. Work Locations and Key Partners



Microtextured Surfaces for Turbine Blade Impingement Cooling, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Microtextured Surfaces for Turbine Blade Impingement Cooling, Phase II

Completed Technology Project (2012 - 2016)



Organizations Performing Work	Role	Type	Location
Micro Cooling Concepts, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Huntington Beach, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

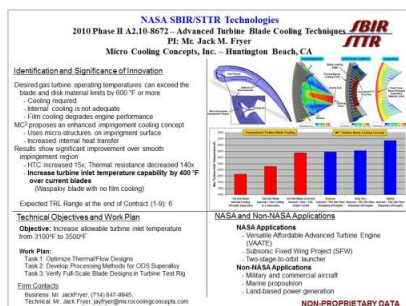
California	Ohio
------------	------

Project Transitions

▶ **April 2012:** Project Start

✓ **July 2016:** Closed out

Images



Briefing Chart

Microtextured Surfaces for Turbine Blade Impingement Cooling, Phase II

(<https://techport.nasa.gov/image/129874>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Micro Cooling Concepts, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jack M Fryer

Co-Investigator:

Jack Fryer

Microtextured Surfaces for Turbine Blade Impingement Cooling, Phase II

Completed Technology Project (2012 - 2016)



Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.3 Aero Propulsion
 - └ TX01.3.4 Pressure Gain Combustion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System